AMENDMENTS TO THE SPECIFICATION:

Please add the following new paragraph and heading after the title on the page 1:

This application claims priority under 35 U.S.C. §119 to Finnish Application 20022265 filed in Finland on 20 December 2002, and is a U.S. national phase application of PCT/FI2003/000978 filed as an International Application on 19 December 2003 designating the U.S.

FIELD OF THE INVENTION

Please insert the following before the paragraph beginning on page 1, line 3, as follows:

BACKGROUND

Please replace the paragraphs beginning on page 1 line 3, and ending on page 2, line14, with he following amended paragraphs:

The propulsion system is normally located in ~~after~~ the aft part of ~~the~~ a marine vessel. The propellers are equipped with hubcap, which is normally covering the propeller fastening bolt. The circulation of water around each forward propeller blade forms a vortex near the hub before ~~they~~ the joint to ~~one~~ the hub ~~vortex~~. This hub vortex cavitation is known to be very harmful to the propulsion unit or the rudder behind the main propeller. The hub vortex is itself erosive but it can also induce other harmful forms of cavitation on ~~construction~~ constructions such as the propulsion unit or ~~after~~ aft propeller blade.

Especially in the CRP propulsion concept whereby another propeller is arranged close to the main propeller this may cause extensive ~~damages~~ damage. The steering of the propulsion unit is not fully competent because of erosive hub vortices. This will shorten the maintenance interval of the propulsion system and thereby the overall costs increase.

A conventional ~~Conventional~~ way to avoid hub vortex cavitation is application of blunt cap after the propeller, which destroy hub ~~vortex~~ vortices due to vast separation after hubcap. But in ~~subject~~ the case of a counter rotating propeller, such a technique ~~way~~ is unacceptable because separation ~~provoke~~ provokes cavitation on the blades of aft propeller especially when the aft thruster operates in steering mode so that the thruster is turned by some angle, and so the fore and aft propellers are not co-axial and blades of aft propeller during its rotation cross the separation zone.

SUMMARY

Accordingly, it is an object of the present invention to provide a new arrangement, which solves the problems caused by the vortices. This object is achieved in connection of the CRP system embodying a construction according to the present invention. ~~by the features as identified in the claims 1 and 11. Further advantageous modifications of the invention are characterized by the features of the subclaims~~.

This invention will reduce or eliminate the above mentioned problem in a CRP propulsion concept and thus protect the ~~after~~ aft propeller and entire propulsion unit itself from damage. The invention will increase the capability to steer the propulsion unit behind forward propeller without danger of erosive hub vortex cavitation and without dangerous cavitation on the blades after hub of forward cavitation. This will lead to a longer lifetime and ~~reduce repairing~~ reduced costs of the propulsion unit.

The invention is based to an idea to break the flow of the vortex caused by the blades of the forward propeller. The hub ~~cab~~ cap of the propeller, ~~in detail~~ specifically, the external appearance of the hubcap is formed so that it consists of at least two[[,]] equally distributed flow plates projecting from the outer surface of the hubcap. The number of the flow plates is in practice not higher than eight, while four flow plates gives the most efficient result.

On the other hand the cap itself should be well-streamlined, with the relation of cap diameter ~~and~~ to cap length not more than 2. It provides the absence of developed separation after hub cap with plates and ~~so make~~ thus makes it possible to eliminate blade cavitation in the separation zone after the fore hub when the thruster is not co-axial with the fore propeller.

The absence of the hub vortex allows the safe operation of ~~after~~ aft propeller and steerable propulsion unit. The invention is advantageous to implement, as it requires no other modifications to the structure or to operation of the propulsion system or its peripheral devices. Further as the invention mainly is realized with a special forming of a separate component, the invention is adaptable also to the propulsion devices currently in use.

Please replace the paragraphs beginning on page 2, line 26, and ending on page 3, line 5, with he following amended paragraphs:

It is another further feature of the invention that the diameter of the tip edges of the plates is in the range of ~~0,4~~ 0.4 –2 times the maximum hub diameter. Within this range the efficiency of the invented appliance is especially advantageous.

The flow plates are fastened to the hub cab either by ~~fixed~~ fixing to the cap ~~by~~ welding or by with bolts. The size and shape of the flow plates is easy to change and vary if necessary depending of the respective requirements. If the flow plates are used with the vessels in use, this possibility might be desirable. Alternatively the hubcap is moulded as one piece with flow plates whereby the hubcap can be handled as an integrated piece.

Please insert the following heading before the paragraph beginning on page 3, line 8, as follows:

BRIEF DESCRIPTION OF THE DRAWINGS

Please insert the following heading before the paragraph beginning on page 3, line 14, as follows:

DETAILED DESCRIPTION

Please replace the paragraph beginning on page 3, line 14, and ending on page 3, line 26, with he following amended paragraph:

Figure 1 shows a propulsion arrangement 2 which is realized with counter rotating propellers (CRP), which is placed under the hull 4 of the vessel. The main propulsion propeller, so called forward propeller 6 is arranged onto the main driving axis 8, which is supported via bearings to the hull 4 of the ship. The forward propeller 6 is driven e.g. by the drive unit, like a diesel engine, directly or via a electric drive that is supplied by a diesel-generator unit by means of a frequency converter which is well-known in the art. The drive unit and the bearing and other features of the power transmission is utilizing conventional ~~technique~~ techniques well-known in the art and there in no need to explain in detail in order to understand the invention. The forward propeller 6 comprises a hub 10 arranged to the driving axis 8 and propeller blades 12 fixed to the hub 10. The number of blades, the inclination of the blades and the size of the blades will be defined when dimensioning the propulsion system of ship and they may vary case by case. The inclination of the blades may also be adjustable.

Please replace the paragraph beginning on page 4, line 21, and ending on page 5, line 3, with he following amended paragraph:

According to a favourable embodiment of the invention four flow plates 28 are mounted symmetrically or with equal distance to each flow plate on the outer surface of the hubcap 30 as shown in the figures 2a and 2b. The figure 2a is the side view and the figure 2b is the front view when seen from the rear of the vessel. The hubcap has length L and diameter D, whereby the ratio D/L is not higher than 2. The flow plates are straight plates that are welded or fixed by bolts to the surface of the main

propeller hubcap 2. The flow plates 2 can also be cast together with the whole propeller hubcap. The flow plate has been installed on the whole length of the cap surface and the flow plates link up to each other outside the cap surface extending a little over the top edge of the cap. In this example the height of the flow plate does not exceed the radial dimensions of the cap. Thus the flow plate does not extend over the diameter of the hubcap. The flow plates are projected in the radial direction from the surface of the hubcap and they are installed in the direction of the propeller axis with no inclination. It has been shown that the tip edges of the flow plates may vary in the range of ~~0,4~~ at to 2 times the maximum hub diameter D. Accordingly this range corresponds about ~~0,12 to 0,4~~ 0.12 to 0.4 times the diameter of the propeller.

Please replace the current Abstract and replace it with the following amended Abstract, set forth below on a separate sheet: